भारतीय मानक
Indian Standard

IS 1199 (Part 5) : 2018

ताजा कंक्रीट — नमूने लेना, परीक्षण एवं विश्लेषण पद्धतियाँ

भाग 5 परिक्षण नमूनों का निर्माण एवं तराई

(पहला पुनरीक्षण)

Fresh Concrete — Methods of Sampling, Testing and Analysis

Part 5 Making and Curing of Test Specimens

(First Revision)

ICS 91.100.30

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December 2018 **Price Group 6**

Cement and Concrete Sectional Committee, CED 02

FOREWORD

This Indian Standard (Part 5) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

Testing plays an important role in controlling the quality of cement concrete work. Systematic testing of the raw materials, the fresh concrete and the hardened concrete, is an inseparable part of any quality control programme for concrete. This helps achieve a higher efficiency of the materials used and greater assurance of the performance of the concrete, in regard to workability, strength and durability. The test methods used should be simple, direct and convenient to apply. This standard was formulated with this objective in view.

This standard was first published in 1959. In this revision, it was decided to review and update the various existing test methods of fresh concrete taking into consideration the latest international practices and developments in this field in the country, and also introduced certain new test methods wherever required. In the process, the various existing test methods covered in IS 1199 : 1959 'Methods of sampling and analysis of concrete', have been revised. The revision of the standard is being brought out taking into consideration primarily the corresponding ISO Standards while also examining the other best practices world over and in the country. In addition, test methods for determination of properties of new types of concrete like self compacting concrete have been included, covering tests such as consistency, viscosity, passing ability and segregation resistance. Also, for better understanding and implementation, some of the other test methods which were spread over in other Indian Standards have been brought together under the fold of IS 1199 as its various parts, such as the setting time of concrete by penetration method and, water soluble and acid soluble chlorides in mortar and concrete. This is with a view to making the standard complete in all respects, and rendering it a comprehensive source of provisions for testing of concrete and reference in other Indian Standards.

In this revision, IS 1199 has been split in to nine parts.The other parts in the series are:

Part 1 Sampling of fresh concrete

Part 2 Determination of consistency of fresh concrete

Part 3 Determination of density of fresh concrete

Part 4 Determination of air content of fresh concrete

Part 6 Tests on fresh self compacting concrete

Part 7 Determination of setting time of concrete by penetration resistance

Part 8 Determination of water soluble and acid soluble chlorides in mortar and concrete

Part 9 Analysis of freshly mixed concrete

This standard (Part 5) covers the specifications regarding the shape and dimensions of concrete test specimens for strength tests and the methods of making and curing these test specimens.

These test methods shall be applicable as and when published in place of the corresponding provisions given in IS 516 : 1959 'Methods of tests for strength of concrete', and will supersede the same.

This revision of the standard has been taken up to incorporate the modifications found necessary in the light of experience gained in its use and also to bring it in line with the latest development on the subject. Significant provisions in this revision are highlighted below:

a) These provisions have been shifted from IS 516 to IS 1199, as it involves fresh concrete.
b) More details have been given for compaction of concrete (including for special concretes like FRC and SCC) and guidance has been included for preferred method of compaction, as per the slump of concrete.

(*Continued on third cover*)

Indian Standard

FRESH CONCRETE — METHODS OF SAMPLING, TESTING AND ANALYSIS

PART 5 MAKING AND CURING OF TEST SPECIMENS

(First Revision)

1 SCOPE

This standard (Part 5) of the standard specifies the shape and dimensions of concrete test specimens for strength tests and the methods of making and curing these test specimens.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this part of standard, the definitions given in IS 4845 and IS 6461 (Parts 1 to 12) shall generally apply.

4 SHAPE, DIMENSIONS AND TOLERANCES OF SPECIMENS AND MOULDS

4.1 Cubes

4.1.1 *Size of Test Specimens*

The test specimens shall be 150 mm cubes, as shown in Fig. 1, where $l = l_1 = l_2 = l_3$. If the largest nominal size of aggregate does not exceed 20 mm, 100 mm cubes may be used as an alternative.

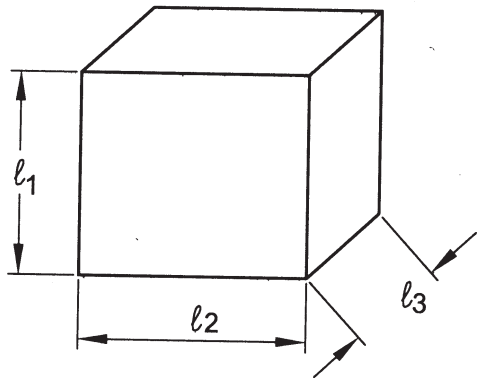

FIG. 1 SIZES OF THE CUBE

4.1.2 *Tolerances*

The tolerances on various dimensions shall conform to **4.1** of IS 10086.

4.2 Cylinders

4.2.1 *Size of Test Specimens*

They shall have a diameter (d) of 150 mm, and a length (l) of 300 mm, as shown in Fig. 2. Smaller test specimens shall have a diameter to maximum nominal size of aggregate ratio of minimum four.

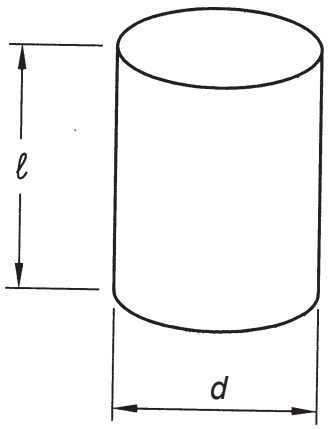

FIG. 2 SIZES OF CYLINDER

4.2.2 *Tolerances*

The tolerances on various dimensions shall conform to **4.1** of IS 10086.

4.3 Beams

4.3.1 *Size of Test Specimens*

The standard size shall be $150(l_1) \times 150(l_2) \times 700(L)$ mm, as shown in Fig. 3. Alternatively, if the largest nominal size of the aggregate does not exceed 20 mm, specimens 100 × 100 × 500 mm may be used.

NOTE — While testing for flexural strength and toughness parameters of fibre reinforced concrete, whereas 150 × 150 × 700 mm moulds shall be used as a standard mould, moulds of shorter length, not less than 550 mm can also be used for this test to decrease the weight of the specimen.

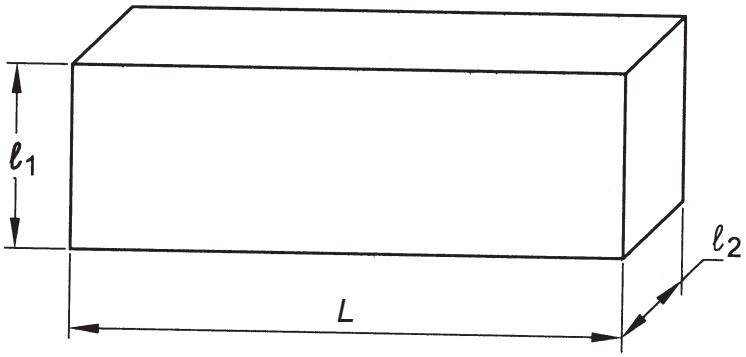

FIG. 3 SIZES OF BEAM

4.3.2 *Tolerances*

The tolerances on various dimensions shall conform to **4.1** of IS 10086.

5 APPARATUS

5.1 Apparatus for Checking the Test Specimens

5.1.1 *Rules and/or Calipers* — These shall be capable of establishing that the relevant dimensions of specimens or moulds are within specified tolerances.

5.1.2 *Gauges and Squares* — These shall be capable of establishing the flatness, perpendicularity, and parallelism of specimens and moulds within specified tolerances.

5.2 Apparatus for Making Test Specimens

5.2.1 *Moulds* — These shall be capable of providing test specimens with the dimensions and tolerances specified in this standard. For specific purposes, other sizes of moulds, as mentioned in IS 10086, may also be used.

Moulds shall normally be made of steel or cast-iron, conforming to requirements of IS 10086. However, any other material which is non-absorbent and non-reactive with concrete and which can retain dimensional stability of the moulds may also be used. Moulds shall be watertight and non-absorbent.

The dimensions of moulds shall be checked at intervals of not more than one year. If the mould is in calibration at the time of use, the checking of parallelism, angularity and flatness of specimens is not required, provided the size measurements are within specified tolerance.

Individual moulds shall be identifiable. The identification number shall either be welded or painted on the mould body or securely tagged to the mould.

While assembling the mould for use, the joints between the sections of the mould shall be thinly coated with mould oil and a similar coating of mould oil shall be applied between the contact surfaces of the bottom of the mould and the base plate in order to ensure that no water escapes during the filling.

5.2.2 *Apparatus for Compacting the Concrete in the Mould*

The apparatus for compacting concrete shall be one of the following:

a) *Tamping rod*, of circular cross-section, straight, made of steel, having a diameter of 16 ± 1 mm and a length of 600 ± 5 mm, and with rounded, roughly hemispherical ends.
b) *Tamping bar*, of square cross-section, made of steel, having ramming face of 25 ± 0.5 mm and a minimum length of 400 ± 2mm, weighing approximately 2 kg and provided with a handle.
c) *Internal (immersion type) vibrator*, with a minimum frequency of 120 Hz (7 200 cycles per minute). The vibrator shall meet the requirements of IS 2505.
d) *Vibrating table***,** with a minimum frequency of 40 Hz (2 400 cycles per minute). The vibrating table shall meet the requirements of IS 2514.

5.2.3 *General Tools*

These shall include the following:

a) *Scoop*, approximately 100 mm wide, made from non-absorbent material, not readily attacked by cement paste, with a size suitable for taking increments of concrete.
b) Steel trowel or float.
c) *Sampling tray or container*, with minimum dimensions of 900 mm × 900 mm and 50 mm depth, of rigid construction and made from non-absorbent material not readily attacked by cement paste.
d) *Shovel,* square-bladed.
e) *Mallet*.

6 PREPARATION OF TEST SPECIMENS

6.1 Sampling

The samples shall be taken in accordance with IS 1199 (Part 1). The samples shall be remixed before

filling the mould. Concrete mixed in laboratory need not be remixed. For concrete having large size aggregates, that is, maximum nominal size of aggregates more than 40 mm, wet sieving shall be carried out as per the procedure given in Annex B.

NOTES

1 When carrying out this test, prevent skin contact with fresh concrete by wearing suitable protective clothing, gloves and footwear. If wet cement or concrete enters the eye, immediately wash it out thoroughly with clean water and seek medical treatment without delay. Wash fresh concrete off the skin immediately.

2 The use of vibrating equipment, such as vibrating tables, can cause damage to joints and loss of sensation due to nerve damage. Moulds, etc, shall be clamped to the table and not held in position using one's hand while they are being vibrated.

3 Some concrete specimens may be too heavy for a single person to handle, and appropriate means may be arranged to handle them. Such heavy moulds and specimens shall be handled with caution to avoid any injuries.

6.2 Preparation and Filling of the Mould

The following procedure shall be followed:

a) Before filling, the interior faces of the assembled mould shall be thinly coated with mould oil to prevent adhesion of the concrete.

b) Place the mould on a rigid horizontal surface.

c) Place the concrete in the mould by means of a scoop in layers of approximately equal depth, each layer not more than 50 mm thick. In placing each scoopful of concrete, move the scoop around the top edge of the mould as the concrete slides from it, in order to ensure a symmetrical distribution of the concrete within the mould. The thickness of the layers may be increased proportionately, if the minimum size of the specimen exceeds 150 mm.

d) Use the quantity of material in the final layer that is just sufficient to fill the mould without having to remove excess material. A small quantity of the concrete may be added in the end, if necessary, and further compacted in order to just fill the mould, but the removal of excess material shall be avoided.

6.3 Compaction of the Concrete

Compact the concrete immediately after each layer is placed in the mould in such a way as to produce full compaction of the concrete with neither excessive segregation nor laitance. Each layer shall be compacted by using one of the methods given in **6.3.1** to **6.3.4**. The preferred method of compaction, may be selected from the guidance given below.

Sl No.	*Slump*	*Preferred Methods of Compaction*
i)	less than 50 mm	Vibrating table or internal vibrator
ii)	50-100 mm	Vibrating table or internal vibrator or tamping bar/tamping rod
iii)	More than 100 mm	Tamping bar/tamping rod

6.3.1 *Compacting with a Tamping Rod*

a) Distribute the strokes of the tamping rod in uniform manner over the cross-section of the mould. Ensure that the tamping rod does not penetrate significantly any previous layer nor forcibly strike the bottom of the mould while compacting the first layer.

b) For cube specimens, having a size, l, of 100 mm and beam specimens having a size $l_1=l_2=$ 100 mm, and cylinders having a diameter, d, of 100 mm, subject the concrete to a minimum of 25 strokes or tamps per layer.

c) For cube specimens, having a size, l, of 150 mm, and beam specimens having a size $l_1=l_2=$ 150 mm, and cylinders having a diameter, d, of 150 mm, subject the concrete to a minimum of 35 strokes or tamps per layer.

d) When compacting specimens of other dimensions or concrete of very high workability, the number of strokes or tamps per layer shall be as appropriate.

e) In order to remove voids or pockets of entrapped air but not the entrained air, after compaction of each layer, tap the sides of the mould with the mallet until large bubbles of air cease to appear on the surface and depressions left by the tamping rod are removed. The number of strokes or tamps shall be recorded.

6.3.2 *Compacting with a Tamping Bar*

The concrete shall be compacted in accordance with **6.3.1**.

6.3.3 *Compacting with a Vibrating Table*

When using a vibrating table, the mould shall be attached or firmly secured to the vibrating table. Apply the vibration for the minimum duration necessary to achieve full compaction of concrete.

Over-vibration may cause excessive segregation and laitance or loss of entrained air, if present. The required duration of vibration will depend upon the workability of the concrete and the effectiveness of the vibrating table and vibration shall cease as soon as the surface of the concrete becomes relatively smooth and has a glazed appearance.

6.3.4 *Compacting with an Internal Vibrator (Immersion Type)*

Apply the vibration by inserting the needle in the concrete for the minimum duration necessary to achieve full compaction of concrete. Over-vibration may cause excessive segregation and laitance or loss of entrained air, if present. Care shall be taken not to touch vibrator to the sides or the bottom of the mould.

NOTES

1 Compaction of fibre reinforced concrete (FRC) shall be carried out by external vibration and external tapping. Internal tamping and internal vibrator are not recommended since this can lead to non-uniform fibre and aggregate distributions. A vibrating table may be used for compaction of FRC.

2 In case of self-compacting concrete, the compaction shall be similar to the actual field condition and generally the mould shall be filled and levelled off without any compaction.

6.4 Surface Levelling

After the top layer has been compacted, remove the concrete above the upper end of the mould using a trowel or a float and level the surface with the top of the mould. Cover the surface with suitable material to prevent evaporation of water.

6.5 Marking

Identify the test specimens with a clear and durable marking, and without damaging the specimen.

Keep records to ensure that the specimen identity is known from sampling to testing.

6.6 Capping Specimens

The cylindrical specimens required for compressive strength test shall be capped as per the procedure given in **6.6.1**.

6.6.1 *Capping Specimens*

The ends of all cylindrical test specimens that are not plane within 0.05 mm shall be capped. Capped surfaces shall not depart from a plane by more than 0.05 mm and shall be at right angles to the axis of the specimens. The planeness of the cap shall be checked by means of a straight edge and feeler gauge, making a minimum of three measurements on different diameters. Caps shall be made as thin as practicable and shall not flow or fracture when the specimen is tested. Capping shall be carried out after moulding of the specimens by neat cement or maybe carried out just prior to testing. The capping using neat cement is described in **6.6.1.1** and for capping of specimens just prior to testing, any method of capping described in IS 516 (Part 4) may be followed.

6.6.1.1 *Neat cement*

Test cylinders may be capped with a thin layer of stiff, neat Portland cement paste after the concrete has ceased settling in the moulds, generally for 2 h to 4 h or more after moulding. The cap shall be formed by means of glass plate not less than 6.5 mm in thickness or a machined metal plate not less than 13 mm in thickness and having a minimum surface dimension at least 25 mm larger than the diameter of the mould. It shall be worked on the cement paste until its lower surface rests on the top of the mould. The cement for capping shall be mixed to a stiff paste for about 2 h to 4 h before it is to be used in order to avoid the tendency of the cap to shrink. Adhesion of paste to the capping plate may be avoided by coating the plate with a thin coat of oil or grease.

7 CURING OF TEST SPECIMENS

Leave the test specimens in the mould for at least 16 h, but not longer than three days, from the time of addition of water to the dry ingredients. Protect the specimens from shock, vibration and water evaporation. Store the specimens at a temperature of 27 ± 3 °C.

After removal from the mould, submerge the test specimens in clean, fresh water immediately. Store the test specimens in water at a temperature of 27 ± 2°C and take it out just prior to testing. Alternately, store the test specimens in a chamber at a temperature of 27 ± 2°C and a relative humidity of at least 95 percent until just before testing.

If the test specimens are to be sent to a test laboratory, cover the test specimens with wet cloth or wet sand/ sawdust or other suitable material or seal the test specimens in plastic bags containing water to ensure that the test specimens are delivered to the test laboratory in damp condition not less than 24 h before the time of testing. At the test laboratory, store the test specimens in water at a temperature of 27 ± 2°C until taking it out just prior to testing.

8 REPORT

The following information regarding the samples shall be included in the sample report:

a) Clear identification of the sample;
b) Time of making the specimen;
c) Method of compaction of the concrete in the mould including type of equipment used;
d) Grade of concrete;
e) Workability of concrete;
f) Method of curing, including duration and temperature range;
g) Any deviations from the standard method of sampling;
h) A declaration by the responsible person that the samples were prepared in accordance with this Indian Standard; and
j) Name and signature of person responsible for sampling.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
460 (Part 2) : 1985	Test sieves: Part 2 Perforated plate test sieves (*third revision*)
516 (Part 4) : 2018	Hardened concrete — Methods of test: Part 4 Sampling, preparing and testing of concrete cores (*first revision*)
1199 (Part 1) : 2018	Fresh concrete — Methods of sampling, testing and analysis: Part 1 Sampling of fresh concrete (*first revision*)
2505 : 1992	Concrete vibrators — Immersion type — General requirements (*third revision*)
2514 : 1963	Specification for concrete vibrating tables
4845 : 1968	Definitions and terminology relating to hydraulic cement
6461	Glossary of terms relating to cement concrete
(Part 1) : 1972	Concrete aggregates
(Part 2) : 1972	Materials (other than cement and aggregate)
(Part 3) : 1972	Concrete reinforcement
(Part 4) : 1972	Types of concrete
(Part 5) : 1972	Formwork for concrete
(Part 6) : 1972	Equipment, tools and plant
(Part 7) : 1973	Mixing, laying, compaction, curing and other construction aspects
(Part 8) : 1973	Properties of concrete
(Part 9) : 1973	Structural aspects
(Part 10) : 1973	Tests and testing apparatus
(Part 11) : 1973	Prestressed concrete
(Part 12) : 1973	Miscellaneous
10086 : 1982	Specification for moulds for use in tests of cement and concrete

ANNEX B

(*Clause* 6.1)

WET-SIEVING OF CONCRETE

B-1 GENERAL

Wet-sieving of concrete is the process of removing aggregate particles larger than 40 mm from the fresh concrete by sieving through a 40 mm IS sieve. The effects of wet-sieving on the test results shall be considered or determined by supplementary testing for quality control or test result evaluation purposes.

Wet-sieving of concrete causes the loss of a small amount of air due to additional handling. The air content of the wet-sieved fraction of concrete is greater than that of the total concrete because the larger size aggregate, which is removed, does not contain air. The apparent strength of wet-sieved concrete in smaller specimens is usually greater than that of the total concrete in larger appropriate size specimens.

B-2 APPARATUS

B-2.1 Sieves

B-2.2 Wet-Sieving Equipment, containing 40 mm IS sieve conforming to IS 460 (Part 2) and conveniently arranged and supported so that one can shake it rapidly by either hand or mechanical means. Generally, a horizontal back-and-forth motion is preferred. The equipment shall be capable of rapidly and effectively removing particles larger than 40 mm.

B-2.3 Hand Tools, includes the following:

a) Shovels,
b) Hand scoops,
c) Steel trowels, and
d) Rubber gloves.

B-3 PROCEDURE

After sampling the concrete and before remixing, sieve the concrete through a 40 mm sieve. Place only enough concrete on the sieve at any one time so that after sieving, the thickness of the layer of retained aggregate is not more than one particle thick. Shake or vibrate the sieve by hand or mechanical means until no undersize material remains on the sieve. Do not wipe off the mortar adhering to the aggregate retained on the sieve before it is discarded. Collect the concrete that passes through the sieve in a batch pan of suitable size that has been dampened before use, or on a clean, moist, non-absorbent surface. Scrape any mortar adhering to the sides of the wet-sieving equipment into the batch. Discard the aggregate particles retained on the sieve. Remix the concrete that has passed through the sieve with a shovel (the minimum amount necessary to ensure uniformity) and proceed immediately with testing.

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Cement and Concrete Sectional Committee, CED 02

Organization	*Representative(s)*
In Personal Capacity (*14A, Summer Breeze, Kuravankonam, Kowdiar, Thiruvananthapuram 695 003*)	Shri Jose Kurian (***Chairman***)
ACC Ltd, Mumbai	Shri S. A. Khadilkar Shri Raman Sadanand Parulekar (*Alternate*)
Ambuja Cements Limited, Ahmedabad	Shri J. P. Desai Dr Bibekananda Mohapatra (*Alternate*)
Atomic Energy Regulatory Board, Mumbai	Shri L. R. Bishnoi Shri Sourav Acharya (*Alternate*)
Builders' Association of India, Mumbai	Shri Sushanta Kumar Basu Shri D. R. Sekor (*Alternate*)
Building Materials and Technology Promotion Council, New Delhi	Shri J. K. Prasad Shri C. N. Jha (*Alternate*)
Cement Manufacturers' Association, Noida	Shri Rakesh Bhargava Dr S. K. Handoo (*Alternate*)
Central Public Works Department, New Delhi	Shri A. K. Garg Shri Rajesh Khare (*Alternate*)
CSIR – Central Building Research Institute, Roorkee	Shri S. K. Singh Shri Subhash Gurram (*Alternate*)
CSIR – Central Road Research Institute, New Delhi	Shri J. B. Sengupta Shri Satish Pandey (*Alternate*)
CSIR – Structural Engineering Research Centre, Chennai	Dr K. Ramanjaneyulu Dr P. Srinivasan (*Alternate*)
Central Soil and Materials Research Station, New Delhi	Director Shri N. Siva Kumar (*Alternate*)
Central Water Commission, New Delhi	Director (CMDD) (N&W) Deputy Director (CMDD) (NW&S) (*Alternate)*
Conmat Technolgies Pvt Ltd, Kolkata	Dr A. K. Chatterjee Shri Subrato Chowdhury (*Alternate*)
Construction Chemical Manufacturers' Association, Mumbai	Shri Samir Surlaker Shri Nilotpol Kar (*Alternate*)
Delhi Development Authority, New Delhi	Shri Laxman Singh Shri Vijay Shankar (*Alternate*)
Department of Science and Technology, Ministry of Science and Technology, New Delhi	Shri Chander Mohan
Engineers India Limited, New Delhi	Shri Rajanji Srivastava Shri Anurag Sinha (*Alternate*)
Gammon India Limited, Mumbai	Shri V. N. Heggade Shri S. C. Upadhyay (*Alternate*)
Hindustan Construction Company Limited, Mumbai	Shri Satish Kumar Sharma Dr Chetan Hazaree (*Alternate*)
Housing and Urban Development Corporation Limited, New Delhi	Shri Deepak Bansal
Indian Association of Structural Engineers, New Delhi	Shri Mahesh Tandon Shri Ganesh Juneja (*Alternate*)
Indian Concrete Institute, Chennai	Shri Vivek Naik Secretary General (*Alternate*)
Indian Institute of Technology Delhi, New Delhi	Representative
Indian Institute of Technology Madras, Chennai	Prof Devdas Menon Dr Manu Santhanam (*Alternate*)

Organization	*Representative(s)*
Indian Institute of Technology Roorkee, Roorkee	Prof V. K. Gupta Dr Bhupinder Singh (*Alternate*)
Indian Roads Congress, New Delhi	Secretary General Director (*Alternate*)
Institute for Solid Waste Research and Ecological Balance, Visakhapatnam	Dr N. Bhanumathidas Shri N. Kalidas (*Alternate*)
Nuvoco Vistas Corporation Limited, Mumbai	Shri Pranav Desai Shri Ravindra Khamparia (*Alternate*)
Military Engineer Services, Engineer-in-Chief's Branch, Army HQ, New Delhi	Maj Gen S. K. Srivastav Shri Man Singh (*Alternate*)
Ministry of Road Transport and Highways, New Delhi	Shri A. P. Pathak Shri A. K. Pandey (*Alternate*)
National Council for Cement and Building Materials, Ballabgarh	Shri V. V. Arora Dr S. Harsh (*Alternate*)
National Test House, Kolkata	Shri Shir Singh Shrimati S. A. Kaushil (*Alternate*)
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OCL India Limited, New Delhi	Dr S. C. Ahluwalia
Public Works Department, Govt of Tamil Nadu, Chennai	Superintending Engineer Executive Engineer (*Alternate*)
The India Cements Limited, Chennai	Dr D. Venkateswaran
The Indian Hume Pipe Company Limited, Mumbai	Shri P. R. Bhat Shri S. J. Shah (*Alternate*)
The Institution of Engineers (India), Kolkata	Dr H. C. Visvesvaraya Shri S. H. Jain (*Alternate*)
The Ramco Cements Limited, Chennai	Shri Balaji K. Moorthy Shri Anil Kumar Pillai (*Alternate*)
Ultra Tech Cement Ltd, Mumbai	Shri Surya Valluri Dr M. R. Kalgal (*Alternate*)
Voluntary Organization in Interest of Consumer Education, New Delhi	Shri M. A. U. Khan Shri B. Mukhopadhyay (*Alternate*)
In personal capacity [*B-806, Oberoi Exquisite, Oberoi Garden City, Goregaon (East), Mumbai*]	Shri A. K. Jain
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In personal capacity (*EA-92, Maya Enclave, Hari Nagar, New Delhi*)	Shri R. C. Wason
In personal capacity (*E-1, 402, White House Apartments, R. T. Nagar, Bengaluru*)	Shri S. A. Reddi
BIS Directorate General	Shri Sanjay Pant, Scientist 'F' and Head (Civil Engg) [Representing Director General (*Ex-officio*)]

Member Secretary
Shrimati Divya S.
Scientist 'B' (Civil Engg), BIS

Concrete Sub-committee, CED 2:2

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Association of Consulting Civil Engineers (India), Bengaluru	Shri Avinash D. Shirode Shri K. K. Meghashyam (*Alternate*)

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Building Materials and Technology Promotion Council, New Delhi	Shri J. K. Prasad Shri Pankaj Gupta (*Alternate*)
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Central Public Works Department, New Delhi	Shri A. K. Garg Shri Rajesh Khare (*Alternate*)
Civil-Aid Technoclinic Pvt Ltd, Bengaluru	Shri M. S. Sudarshan Shri R. Nagendra (*Alternate*)
Creative Design Consultants and Engineers Pvt Ltd, Ghaizabad	Shri Aman Deep
CSIR – Central Building Research Institute, Roorkee	Dr Rajesh Deolia Shri H. C. Arora (*Alternate*)
CSIR – Central Road Research Institute, New Delhi	Shri J. B. Sengupta Shri Satish Pandey (*Alternate*)
CSIR – Central Soil & Materials Research Station, New Delhi	Shri Rajeev Kumar Shri M. Raja (*Alternate*)
CSIR–Structural Engineering Research Centre, Chennai	Dr B. H. Bharath Kumar Dr P. Srinivasan (*Alternate*)
Department of Science and Technology, Ministry of Science and Technology, New Delhi	Shri Chander Mohan
Elkem South Asia Pvt Ltd, Navi Mumbai	Shri Brajesh Malviya Shri Surendra Sharma (*Alternate*)
Engineers India Limited, New Delhi	Shri Rajanji Srivastava Shri Anurag Sinha (*Alternate*)
Gammon India Limited, Mumbai	Shri Manish Mokal Shri Sudeesh Rajendran (*Alternate*)
Hindustan Constrution Company Ltd, Mumbai	Dr Chetan Hazare Shri Avinash Harde (*Alternate*)
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In personal capacity (*Type IV/17, President's Estate, New Delhi*)	Shri K. H. Babu

(*Continued from second cover*)

c) The wet sieving procedure for concrete having large size aggregates (msa more than 40 mm), has been incorporated.
d) Clause on reporting has been reviewed and elaborated.
e) More details on dimensions, tolerances and fabrication materials of moulds have been included.

In the formulationof this standard, assistance has also been derived from ISO 1920-3 : 2004 'Testing of concrete — Part 3: Making and curing test speciments'.

The composition of the Committee responsible for the formulation of this standard is given in Annex C.

In reporting the result of a test or analysis made in accordance with this standard, is to be rounded off, if the final value observed or calculated, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

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